Environmental Equalizers, Inc.

I-09083
3/3/98
NB

Groundwater Monitoring Report
First Quarter 1998

LADPW LOP File No. I-9083

Former Unocal Corporation District Office
9645 Santa Fe Springs Road
Santa Fe Springs, California 90670

February 26, 1998

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Groundwater Monitoring Report - First Quarter 1998

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EEI Project No. 970401

TABLE OF CONTENTS

EXECUTIVE SUMMARY

Environmental Equalizers, Inc. (EEI) has completed the first quarter 1998 monitoring of the former Unocal Oil & Gas Division Headquarters in Santa Fe Springs, California. The findings and conclusions of this monitoring data, subject to the limitations of Section 6.0, are summarized below.

- Groundwater beneath the site is found at a depth of approximately 36 to 38 feet bgs.
- Groundwater flow direction at the site is consistent with previous quarters with a southerly trend at a hydraulic gradient of 0.001.
- Based on groundwater data obtained during this quarter, concentrations of benzene in groundwater have increased significantly in both the upgradient and downgradient perimeter wells. The concentrations of benzene in and around MW-1 have shown a substantial decrease over the last year.
- The increasing concentrations of benzene in the upgradient monitoring wells may indicate an offsite source. Dayton Superior, identified as having an unauthorized release of fuel hydrocarbons, is located immediately upgradient of the Unocal property.
- MTBE does not appear to be present on site in significant concentrations except at MW-1.
- Continued groundwater monitoring at this site appears to be warranted.

1.0 INTRODUCTION

This report summarizes groundwater monitoring and sampling activities performed by Environmental Equalizers, Inc. (EEI) during the first quarter 1998 at the former Unocal Corporation District Office at 9645 South Santa Fe Springs Road in Santa Fe Springs, California (Figure 1).

Two separate monitoring and sampling events are included in this report. The first, which occurred on January 13, 1998, involved four monitoring wells (MW-1, MW-2, MW-6, and HW-1, Figure 2) and was performed at the request of State Underground Storage Tank Cleanup Fund (USTCF) staff. The purpose of this limited sampling was to ascertain the current condition of groundwater at the site in consideration of possible regulatory closure. The second event occurred on January 27, 1998, and involved all nine monitoring wells on site (Figure 2). This second event was deemed necessary after a review of the January 13 sample results indicated elevated concentrations of benzene in HW-1, and methyl-tert-butyl-ether (MTBE) in MW-1.

2.0 SITE BACKGROUND

The former Unocal Corporation District Office-Santa Fe Springs site is located within an area where oil production, storage, refining, and other chemical manufacturing have occurred for over 75 years. These operations have included the use of nearby properties as a dump sites for asphalt, tank bottoms, cutting solvents (chlorinated hydrocarbons), processed hydrocarbon-residual waste containing polynuclear aromatic hydrocarbons (PNAs), and other compounds. Regional investigative data suggests that dissolved chlorinated hydrocarbons, PNAs, and other exotic organic compounds can be found in shallow groundwater (Gage Aquifer) near the site. In addition, an evaluation conducted by Unocal indicates that this aquifer was also impacted by an adjacent UST leak (Dayton Superior), located upgradient from the Unocal property.

The project site is the former location of a leaking underground gasoline storage tank (UST). The former UST was used by Unocal to fuel company vehicles prior to 1989. Sampling during tank removal operations in 1989, and during subsequent investigations, indicated that fuel hydrocarbons had impacted soil and shallow groundwater beneath the site.

In 1992, a Soil Vapor Extraction (SVE) system was permitted and installed to remediate fuel constituents. The system operated at the site from the fourth quarter of 1992 until the fourth quarter of 1996. During that time, the SVE removed and processed over 90,000 pounds of fuel hydrocarbons from the vadose zone.

Confirmation soil sampling indicated that the SVE had successfully removed 85 to 100 percent of fuel associated constituents in most of the unsaturated zone. Residual contamination was primarily found to be remain in some of the fine-grained materials at the site.

3.0 FIELD ACTIVITIES - FIRST QUARTER 1998

3.1 Safety Briefing

Field personnel onsite were required to follow a health and safety plan (H&SP) developed for environmental investigations and the specific site in this investigation. At the beginning of field activities, the scope of work was discussed, and personnel were advised of hazards, proper safety practices, and the necessary protective equipment needed. A H&SP for this project has been prepared and is updated, where necessary, each time additional field work is conducted. A copy of the H&SP for this property is available from EEI's project files.

3.2 Groundwater Monitoring - January 13, 1998

On January 13, 1998, the depth to groundwater in monitoring wells MW-1, MW-2, MW-6, and HW-1, was measured using an electronic water level meter in conjunction with an engineers scale to provide water depths to within a hundredth of a foot. The groundwater elevation was then calculated for each well by subtracting the depth to groundwater measurement from the casing head elevation (Table 1).

Water gauging data indicates that the depth to groundwater was approximately 36 to 38 feet below ground surface (bgs). Groundwater elevations had decreased by an average 0.14 feet in the four wells since the fourth quarter 1996. Groundwater levels ranged from 117.63 (HW-1) to 117.80 (MW-1) feet above mean sea level.

In order to estimate the direction of groundwater flow and the hydraulic gradient, the groundwater elevation data were plotted on a site map and contoured to produce a map of the potentiometric surface (Figure 3). The direction of groundwater flow continues to the south at a nearly flat hydraulic gradient of 0.001.

3.3 Groundwater Monitoring - January 27, 1998

On January 27, 1998, the depth to groundwater in all nine monitoring wells was measured using an electronic water level meter. The groundwater elevation was then calculated for each well by subtracting the depth to groundwater measurement from the casing head elevation.

Water gauging data indicates that the most current depth to groundwater remains approximately 36 to 38 feet bgs (Table 1). On average, groundwater elevations remained consistent (i.e., within approximately 0.1 feet) with the measurements of January 13. Groundwater levels ranged from 117.72 (HW-1) to 117.93 (MW-4) feet above mean sea level.

As before, the groundwater elevation data were plotted on a site map and contoured to produce a map of the potentiometric surface (Figure 4). The direction of groundwater flow continues to the south at a nearly flat hydraulic gradient of 0.001.

3.4 Groundwater Sampling

Following the depth to water measurements, the monitoring wells (four on January 13 and nine on January 27) were purged using a Grundfos, 2.5-inch diameter electronic submersible pump. To prevent cross-contamination between wells, the pump was triple washed before and after each purging event, using an Alconox detergent solution, and followed by a double tap water rinse. Rinse water was also pumped through the inner pump assembly after each sampling event. All purged water was immediately placed in DOT-approved drums, labeled, and stored onsite for appropriate handling at a later date.

During purging, dissolved oxygen, turbidity (NTU), specific conductivity, temperature, and pH were monitored to ensure stable groundwater conditions (Well Purge Logs, Appendix A). All groundwater samples were collected within 2 hours or after 90 percent recovery (whichever occurred first). Each sample was collected using a new polyethylene disposable bailer. Sampled water was transferred from the bailer into 40-ml VOAs preserved with hydrochloric acid. The samples were immediately labeled, sealed with custody tape, placed on ice in a cooler, and transported the day of collection to NEL Laboratories in Costa Mesa, California. Laboratory reports and chain-of-custody documentation are included in Appendix B.

3.5 Laboratory Analysis Program

Groundwater samples from both sampling events were analyzed for Total Petroleum Hydrocarbons (TPH-G) using EPA Method 8015 modified for gasoline, and for benzene, toluene, ethylbenzene, xylenes (BTEX), and methyl-tert-butyl-ether (MTBE) using EPA Method 8020. A duplicate sample (collected from MW-2) and trip blank consisting of organic-free, deionized water were utilized for the groundwater samples. The laboratory analysis results for these, as well as the previous sampling events, are summarized in Table 2.

4.0 LABORATORY ANALYTICAL RESULTS

4.1 January 13, 1998 Sampling

Groundwater samples collected by EEI during this sampling event contained elevated concentrations of TPH-G (Table 2). TPH-G concentrations reportedly ranged from 653 micrograms per liter (ug/l) in MW-6 to 1,390 ug/l in MW-1. TPH-G concentrations in each of the four wells had increased significantly since the fourth quarter 1996. The largest increase in TPH-G was seen in MW-2, which increased from 670 ug/l to 1,270 ug/l.

All four wells reportedly contained detectable concentrations of benzene. Benzene concentrations ranged from 4.7 ug/l (MW-2) to 79 ug/l (HW-1). Benzene concentrations had increased in all wells since fourth quarter 1996 except MW-1, which showed a decrease 110 ug/l to 18 ug/l. The largest increase was in HW-1, which reportedly increased from 23 ug/l to 79.

Reported concentrations of MTBE, not previously analyzed at this site, ranged from 1.9 ug/l in MW-6, to 184 ug/l in MW-1.

4.2 January 27, 1998 Sampling

Groundwater samples collected by EEI during this sampling event reportedly contained TPH-G concentrations ranging from 320 ug/l in MW-4 to 980 ug/l in MW-1. TPH-G concentrations on average had decreased slightly since the January 13 sampling event. However, nearly all reported TPH-G concentrations were greater than those reported in fourth quarter 1996.

Reported benzene concentrations ranged from 3.2 ug/l (MW-2) to 74 ug/l (HW-1). Benzene concentrations had also decreased slightly since January 13, but showed increases overall in wells MW-3, MW-4, MW-5, MW-7 and HW-1 since fourth quarter 1996. A significant increase was noted in MW-7, which reportedly increased from 7.8 ug/l to 42 ug/l. Figure 5 represents the distribution of benzene concentrations in groundwater resulting form the January 27 sampling. The map shows two distinct plumes. The first, obviously related to the underground storage tank (UST) release on site, extends in a southerly direction from MW-1 toward HW-1. The second plume, located in and around MW-7, has an undetermined origin, being upgradient for the UST location on site.

Reported concentrations of MTBE ranged from 1.6 ug/l in MW-3, to 39 ug/l in MW-1. While the concentrations of MTBE in MW-2, MW-6, and HW-1 remained essentially unchanged since the January 13 sampling, the concentration in MW-1 showed a significant decrease from 184 ug/l to 39 ug/l.

4.3 Quality Assurance/Quality Control Sample Results

Laboratory Quality Assurance/Quality Control (QA/QC) protocol for both sampling events consisted of the use of method blanks, laboratory control spikes (i.e., matrix spike and matrix spike duplicate), and surrogates. Laboratory QA/QC was supplemented by EEI through the use of field duplicates and trip blanks.

For the January 13 sampling, both trip and method blanks (which consisted of organic-free, deionized water) reportedly contained no detectable concentrations of any of the analytes tested. Matrix spikes and matrix spike duplicates all reported recovery within acceptable ranges. Surrogate recovery on all samples, however, exceeded the maximum allowable range of 70 to 130 percent. As a result of probable matrix effects, the results of these samples should be regarded as estimated values, likely reflecting slightly higher concentrations than those actually present. The duplicate sample, collected from MW-2, reportedly contained results well within one order of magnitude of the original sample.

For the January 27 sampling, both trip and method blanks (which consisted of organic-free, deionized water) reportedly contained no detectable concentrations of any of the analytes tested. Surrogate recovery on all samples, except MW-5 and MW-6, were within the maximum allowable range of 70 to 130 percent. As a result of probable matrix effects, the results of these samples should be regarded as estimated values, likely reflecting slightly higher concentrations than those actually present. The duplicate sample, collected from MW-2, reportedly contained results well within one order of magnitude of the original sample.

5.0 SUMMARY

Based on a review of this, and previous monitoring/sampling data, EEI has the following conclusions.

- Groundwater beneath the site is found at a depth of approximately 36 to 38 feet bgs.
- Groundwater flow direction at the site is consistent with previous quarters with a southerly trend at a hydraulic gradient of 0.001.
- Based on groundwater data obtained during this quarter, concentrations of benzene in groundwater have increased significantly in both the upgradient and downgradient perimeter wells. The concentrations of benzene in and around MW-1 have shown a substantial decrease over the last year.
- The increasing concentrations of benzene in the upgradient monitoring wells may indicate an offsite source. Dayton Superior, identified as having an unauthorized release of fuel hydrocarbons, is located immediately upgradient of the Unocal property.
- MTBE does not appear to be present on site in significant concentrations except at MW-1.
- Continued groundwater monitoring at this site appears to be warranted.

6.0 LIMITATIONS

This report was prepared solely for the use and benefit of EEI's client Unocal Corporation. Unocal Corporation may release this Information to third parties, who may use and rely upon this Information at their discretion. However, any use of or reliance upon this Information by a party other than Unocal Corporation shall be solely at the risk of such third party and without legal recourse against EEI; its subsidiaries and affiliates; or their respective employees, officers, or directors; regardless of whether the action in which recovery of damages is sought is based upon contract, statute, or otherwise. This Information shall not be used or relied upon by a party which does not agree to be bound by the above statement.

The content and conclusions provided by EEI in this assessment are based on information collected during our investigation, which may include, but is not limited to, visual site inspections, interviews with the site owner, regulatory agencies and other pertinent individuals, a review of available public documents, subsurface exploration and laboratory testing of groundwater samples, and our professional judgment based on said information at time of preparation of this document. Any subsurface sample results and observations presented herein are considered to be representative of the area of investigation; however, geological conditions may vary between wells and may not necessarily apply to the general site as a whole. If future subsurface or other conditions are revealed which may vary from these findings, the newly-revealed conditions must be evaluated and may invalidate the conclusions of this report.

This report has been prepared in accordance with generally accepted practices using standards of care and diligence normally practiced by recognized consulting firms performing services of a similar nature. EEI is not responsible for the accuracy of information provided by other individuals or entities which is used in this report. This report presents our professional judgment based upon data and findings identified in this report, and the interpretation of such data based upon our experience and background, and no warranty, either expressed or implied, is made. The conclusions presented are based upon the current regulatory climate and may require revision if future regulatory changes occur.

TABLES

TABLE 1
Groundwater Elevation Data

Well ID No.	Date	Casing Elevation (feet AMSL)	Depth to Groundwater (feet)	Groundwater Elevation (feet AMSL)
MW-1	3/93	155.26	42.78	112.48
	6/93		39.19	116.07
	9/93		38.65	116.61
	12/93		38.08	117.18
	3/94		37.43	117.83
	6/94		31.30	123.96
	9/94		37.32	117.94
	12/94		37.98	117.28
	3/95		37.20	118.06
	6/95		35.65	119.61
	9/95		35.34	119.92
	12/95		36.83	118.43
	3/96		36.51	118.75
	6/96		35.67	119.59
	10/96		36.83	118.43
	12/96		37.36	117.90
	1/13/98		37.46	117.80
	1/27/98		37.35	117.91
MW-2	3/93	155.74	43.40	112.34
	6/93		39.83	115.91
	9/93		39.30	116.44
	12/93		38.71	117.03
	3/94		38.07	117.67
	6/94		37.42	118.32
	9/94		37.92	117.82
	12/94		39.56	116.18
	3/95		37.84	117.90
	6/95		36.30	119.44
	9/95		36.00	119.74
	12/95		37.45	118.29
	3/96		37.10	118.64
	6/96		36.29	119.45
	10/96		37.41	118.33
	12/96		37.92	117.82
	1/13/98		38.06	117.68
	1/27/98		37.92	117.82
MW-3	3/93	155.78	43.34	112.44
	6/93		39.73	116.05
	9/93		39.19	116.59
	12/93		38.64	117.14
	3/94		38.05	117.73
	6/94		37.40	118.38
	9/94		37.90	117.88
	12/94		39.52	116.26
	3/95		37.70	118.08
	6/95		36.20	119.58

TABLE 1 (continued)
Groundwater Elevation Data

Well ID No.	Date	Casing Elevation (feet AMSL)	Depth to Groundwater (feet)	Groundwater Elevation (feet AMSL)
MW-3	9/95	155.78	35.94	119.84
	12/95		37.43	118.35
	3/96		37.11	118.67
	6/96		36.27	119.51
	10/96		37.39	118.39
	12/96		37.91	117.87
	1/27/98		37.92	117.86
MW-4	3/93	154.13	41.54	112.59
	6/93		39.98	114.15
	9/93		37.46	116.67
	12/93		36.87	117.26
	3/94		36.30	117.83
	6/94		35.60	118.53
	9/94		36.18	117.95
	12/94		37.79	116.34
	3/95		36.02	118.11
	6/95		34.45	119.68
	9/95		34.12	120.01
	12/95		35.63	118.50
	3/96		35.41	118.72
	6/96		34.49	119.64
	10/96		35.82	118.51
	12/96		36.08	118.05
	1/27/98		36.20	117.93
MW-5	3/93	155.33	42.75	112.58
	6/93		39.06	116.27
	9/93		38.55	116.78
	12/93		38.03	117.30
	3/94		37.45	117.88
	6/94		36.75	118.58
	9/94		37.34	117.99
	12/94		39.08	116.25
	3/95		37.24	118.09
	6/95		35.60	119.73
	9/95		35.23	120.10
	12/95		36.98	118.35
	3/96		36.44	118.89
	6/96		35.65	119.68
	10/96		36.93	118.40
	12/96		37.37	117.96
	1/27/98		37.49	117.84
MW-6	3/93	153.87	41.56	112.31
	6/93		39.95	113.92
	9/93		37.60	116.27
	12/93		36.96	116.91
	3/94		36.40	117.47

TABLE 1 (continued)
Groundwater Elevation Data

Well ID No.	Date	Casing Elevation (feet AMSL)	Depth to Groundwater (feet)	Groundwater Elevation (feet AMSL)
MW-6	6/94	153.87	35.71	118.16
	9/94		36.18	117.69
	12/94		37.66	116.21
	3/95		36.10	117.77
	6/95		34.60	119.27
	9/95		34.26	119.61
	12/95		35.56	118.31
	3/96		35.36	118.51
	6/96		34.52	119.35
	10/96		35.56	118.31
	12/96		36.05	117.82
	1/13/98		36.21	117.66
	1/27/98		36.10	117.77
MW-7	9/94	154.78	37.40	117.38
	12/94		38.56	116.22
	3/95		35.55	119.23
	6/95		35.00	119.78
	9/95		34.68	120.10
	12/95		36.44	118.34
	3/96		36.07	118.71
	6/96		35.08	119.70
	10/96		36.36	118.42
	12/96		36.82	117.96
	1/27/98		36.93	117.85
MW-8	9/94	153.88	36.16	117.72
	12/94		37.61	116.27
	3/95		35.80	118.08
	6/95		34.20	119.68
	9/95		33.97	119.91
	12/95		35.43	118.45
	3/96		35.21	118.67
	6/96		34.25	119.63
	10/96		35.42	118.46
	12/96		35.92	117.96
	1/27/98		35.98	117.90
HW-1	9/94	154.29	36.58	117.71
	12/94		38.14	116.15
	3/95		36.50	117.79
	6/95		35.15	119.14
	9/95		34.80	119.49
	12/95		36.07	118.22
	3/96		35.92	118.37
	6/96		35.09	119.20
	10/96		36.02	118.27
	12/96		36.52	117.77
	1/13/98		36.66	117.63
	1/27/98		36.57	117.72

TABLE 2
Analytical Results of Groundwater Samples (reported in ug/l)

Well ID No.	Sample Date	TPH-G	B	T	E	X	MTBE
MW-1	3/93	ND	64	ND	ND	4.1	NT
	6/93	4700	29	ND	2.3	1.2	NT
	9/93	590	17	ND	1.1	ND	NT
	12/93	700	13	ND	ND	ND	NT
	3/94	730	12	ND	ND	ND	NT
	6/94	1200	ND	ND	ND	ND	NT
	9/94	180	16	ND	48	71	NT
	12/94	3100	210	3.8	6.7	160	NT
	3/95	2300	160	4.1	1.4	110	NT
	6/95	2600	190	3.0	91	110	NT
	9/95	2000	160	1.8	120	130	NT
	12/95	2400	280	4.7	210	120	NT
	3/96	3000	200	1.6	87	120	NT
	6/96	960	72	3.0	18	5.6	NT
	9/96	560	4.5	ND	2.7	ND	NT
	12/96	1200	110	2.1	41	5.4	NT
	1/13/98	1390	18	2.5	1.8	4.4	184
	1/27/98	980	9.5	2.0	0.7	2.2	39
MW-2	3/93	ND	2.4	ND	ND	ND	NT
	6/93	4700	4.3	ND	ND	ND	NT
	9/93	1600	3.6	ND	ND	ND	NT
	12/93	810	1.5	ND	ND	1.2	NT
	3/94	260	2.8	ND	ND	ND	NT
	6/94	700	5.2	ND	ND	ND	NT
	9/94	850	2.1	ND	ND	ND	NT
	12/94	1500	15	ND	ND	1.3	NT
	3/95	850	7.5	0.59	0.92	2.5	NT
	6/95	1100	4.2	ND	ND	1.7	NT
	9/95	560	3.7	3.3	ND	3.4	NT
	12/95	450	2.8	ND	ND	ND	NT
	3/96	690	6.6	3.3	0.55	2.8	NT
	6/96	620	5.3	0.8	ND	1.5	NT
	9/96	770	3.7	0.75	2.1	2.3	NT
	12/96	670	4.4	ND	ND	2.8	NT
	1/13/98	1200	4.7	3.8	0.9	3.4	6.2
	1/27/98	960	3.2	1.7	ND	1.5	6.5
MW-2 (Duplicate)	1/13/98	NT	4.4	2.1	1.0	3.3	4.4
	1/27/98	940	3.3	1.8	1.5	1.6	7.2
MW-3	3/93	5300	9.4	ND	ND	ND	NT
	6/93	2500	3.4	ND	ND	ND	NT
	9/93	700	2.2	ND	ND	ND	NT
	12/93	500	1.5	ND	ND	ND	NT
	3/94	1200	1.2	ND	ND	ND	NT
	6/94	570	2.2	ND	ND	ND	NT
	9/94	290	ND	ND	ND	ND	NT
	12/94	940	18	ND	ND	ND	NT

TABLE 2 (continued)
Analytical Results of Groundwater Samples (reported in ug/l)

Well ID No.	Sample Date	TPH-G	B	T	E	X	MTBE
MW-3	3/95	1600	4.4	1.6	5.4	7.0	
	6/95	1200	2.4	1.8	ND	4.4	NT
	9/95	400	2.2	0.7	ND	4.1	NT
	12/95	310	2.9	1.1	ND	ND	NT
	3/96	350	4.3	1.1	ND	3.6	NT
	6/96	200	2.1	ND	ND	2.5	NT
	9/96	400	3	ND	1.5	2.5	NT
	12/96	460	17	0.6	4	20	NT
	1/27/98	360	12.1	ND	ND	ND	1.6
MW-3 (Duplicate)	12/94	920	16	ND	ND	ND	NT
	3/95	1100	4.7	2.5	2.9	8.7	NT
	6/95	1900	2.5	2.2	ND	6.7	NT
	9/95	290	2	0.6	ND	2.9	NT
	6/96	470	2.1	ND	ND	5.5	NT
	12/96	480	23	ND	5.4	25	NT
MW-4	3/93	ND	4.6	12	2	2.4	NT
	6/93	340	7.0	3.6	ND	ND	NT
	9/93	510	4.3	3.5	ND	ND	NT
	12/93	360	3.4	3	2.2	ND	NT
	3/94	310	4.7	8.1	ND	ND	NT
	6/94	250	4.5	1.4	ND	ND	NT
	9/94	240	6.8	ND	ND	ND	NT
	12/94	720	4.3	ND	ND	ND	NT
	3/95	200	1.4	0.8	1.1	ND	NT
	6/95	290	2.5	ND	ND	1.1	NT
	9/95	180	1.4	0.6	ND	2.9	NT
	12/95	350	1.6	0.9	ND	ND	NT
	3/96	230	1.8	1.6	ND	ND	NT
	6/96	170	2.1	ND	ND	1.1	NT
	9/96	230	1.1	0.6	0.7	1.4	NT
	12/96	290	2.1	2.1	ND	2.9	NT
	1/27/98	320	3.9	1.8	ND	ND	6.1
MW-5	3/93	ND	8.2	37	1.7	ND	NT
	6/93	1200	6.8	ND	ND	ND	NT
	9/93	1200	7.5	ND	ND	ND	NT
	12/93	590	7.4	ND	ND	ND	NT
	3/94	1400	6.4	ND	ND	ND	NT
	6/94	760	7	ND	ND	ND	NT
	9/94	830	7.9	ND	ND	ND	NT
	12/94	1100	ND	ND	ND	ND	NT
	3/95	780	7.8	3.1	4.2	6.6	NT
	6/95	440	5.6	ND	ND	1.1	NT
	9/95	470	6.4	ND	0.6	4	NT
	12/95	300	6.3	0.5	ND	ND	NT

TABLE 2 (continued)
Analytical Results of Groundwater Samples (reported in ug/l)

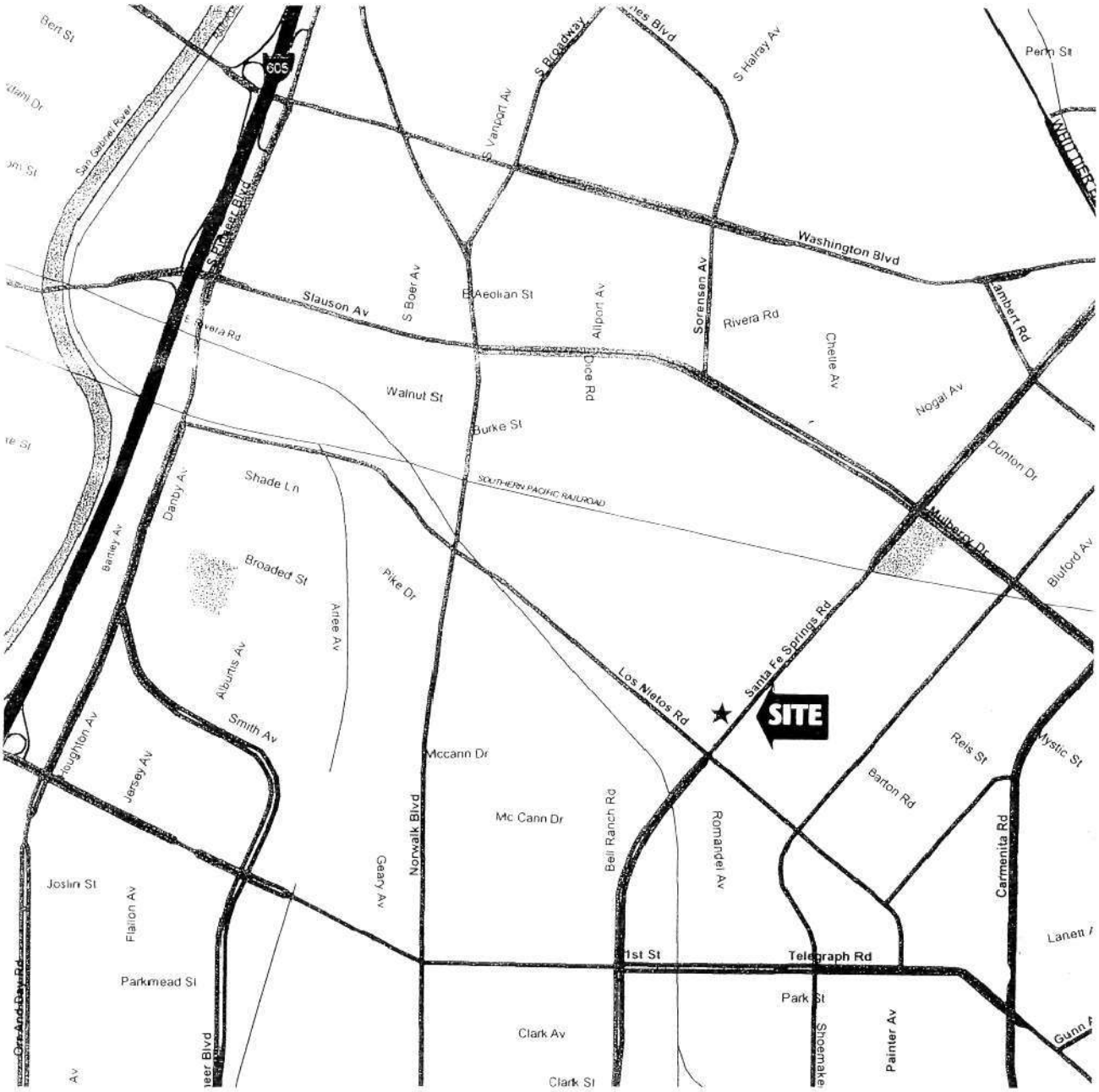
Well ID No.	Sample Date	TPH-G	B	T	E	X	MTBE
MW-5	3/96	470	4.9	1.4	ND	ND	NT
	6/96	540	5.4	ND	ND	2.8	NT
	9/96	440	5.4	0.5	1.7	0.7	NT
	12/96	ND	8.2	0.8	ND	1.9	NT
	1/27/98	580	9.2	1.7	ND	1.8	4.4
MW-6	3/93	ND	1.8	6.6	ND	ND	NT
	6/93	1300	1.9	ND	ND	ND	NT
	9/93	890	8.5	ND	ND	ND	NT
	12/93	180	6.5	7.9	ND	ND	NT
	3/94	240	12	ND	ND	ND	NT
	6/94	710	11	43	ND	ND	NT
	9/94	260	9.7	ND	ND	ND	NT
	12/94	640	8.6	ND	ND	ND	NT
	3/95	580	9.5	1.8	0.9	3.1	NT
	6/95	440	8.8	0.6	ND	1.2	NT
	9/95	260	9.7	0.5	ND	2.3	NT
	12/95	390	6.7	1.2	ND	ND	NT
	3/96	440	10	0.9	ND	ND	NT
	6/96	400	9.3	MD	ND	ND	NT
	9/96	390	7.2	0.7	1.2	1.8	NT
	12/96	490	8.3	1.3	ND	3.2	NT
	1/13/98	653	9.1	3.4	0.8	2.6	1.9
	1/27/98	610	6.2	1.4	ND	ND	3
MW-7	9/94	830	6.2	2.7	6.2	9.2	NT
	12/94	1000	10	ND	7.3	ND	NT
	3/95	520	2.4	0.7	3.6	3.6	NT
	6/95	730	2.7	0.8	0.5	3.4	NT
	9/95	510	2.8	0.4	0.5	4.3	NT
	12/95	210	1	ND	ND	ND	NT
	3/96	400	0.5	ND	ND	ND	NT
	6/96	390	2.2	ND	ND	ND	NT
	9/96	330	2.7	ND	ND	1.9	NT
	12/96	ND	7.8	ND	ND	1.9	NT
	1/27/98	540	42	0.7	5	4.8	6.9
MW-8	9/94	1100	2.9	1.1	11	33	NT
	12/94	1300	3.2	ND	ND	ND	NT
	3/95	740	2.1	4.7	1.2	6.9	NT
	6/95	680	0.9	2.4	ND	3.4	NT
	9/95	840	1.8	3	ND	5.9	NT
	12/95	820	0.9	1.4	ND	ND	NT
	3/96	810	2.4	1.1	ND	ND	NT
	6/96	720	1.6	ND	ND	ND	NT
	9/96	1000	1.9	ND	6.2	2.4	NT
	12/96	660	1.9	ND	ND	4.6	NT
	1/27/98	790	ND	ND	1.3	ND	1.9

TABLE 2 (continued)
Analytical Results of Groundwater Samples (reported in ug/l)

Well ID No.	Sample Date	TPH-G	B	T	E	X	MTBE
HW-1	9/94	580	2.4	ND	ND	ND	NT
	12/94	820	5.2	1.1	ND	ND	NT
	3/95	570	2.4	0.9	4.3	2.9	NT
	6/95	240	1.1	ND	ND	1.1	NT
	9/95	320	1.9	0.5	ND	3.7	NT
	12/95	430	2.3	0.8	ND	ND	NT
	3/96	ND	3	ND	ND	ND	NT
	6/96	430	9.6	0.6	2.1	2.8	NT
	9/96	550	21	1.8	1.5	1.2	NT
	12/96	610	23	ND	ND	4.1	NT
	1/13/98	918	79	2.3	1.2	3	2.7
	1/27/98	840	74	1.1	1.7	2.2	2.6

TPH-G = Total Petroleum Hydrocarbons as Gasoline, B = Benzene, T = Toluene, E = Ethylbenzene, X = Xylenes
MTBE = Methyl-tert-butyl-ether, ND = Not Detected, NT = Not Tested.

FIGURES



SCALE: 1" = 2,200'

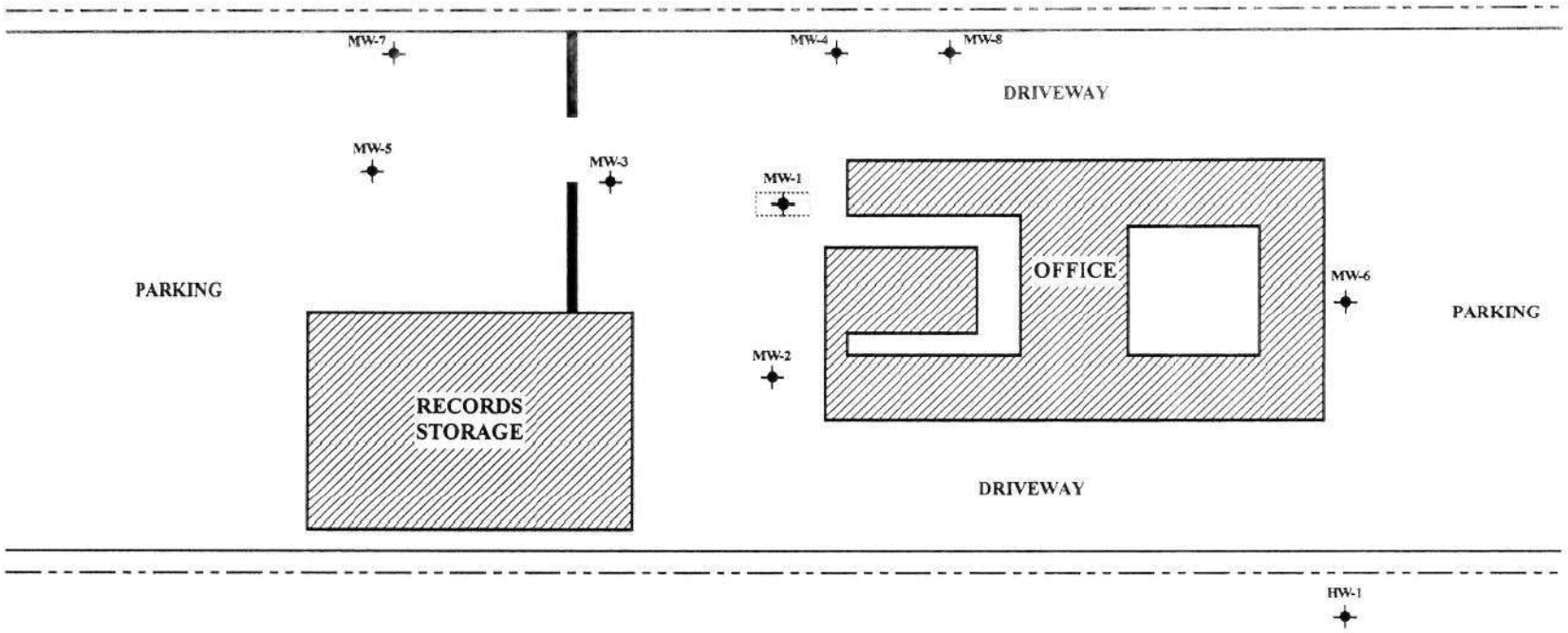
0 1320 2200 4400ft.

N

SITE LOCATION MAP
UNOCAL CORPORATION
9645 South Santa Fe Springs Road
Santa Fe Springs, California

Environmental Equalizers, Inc.

FIGURE 1



SCALE: 1"=80'

0 48 80 160 ft.

N

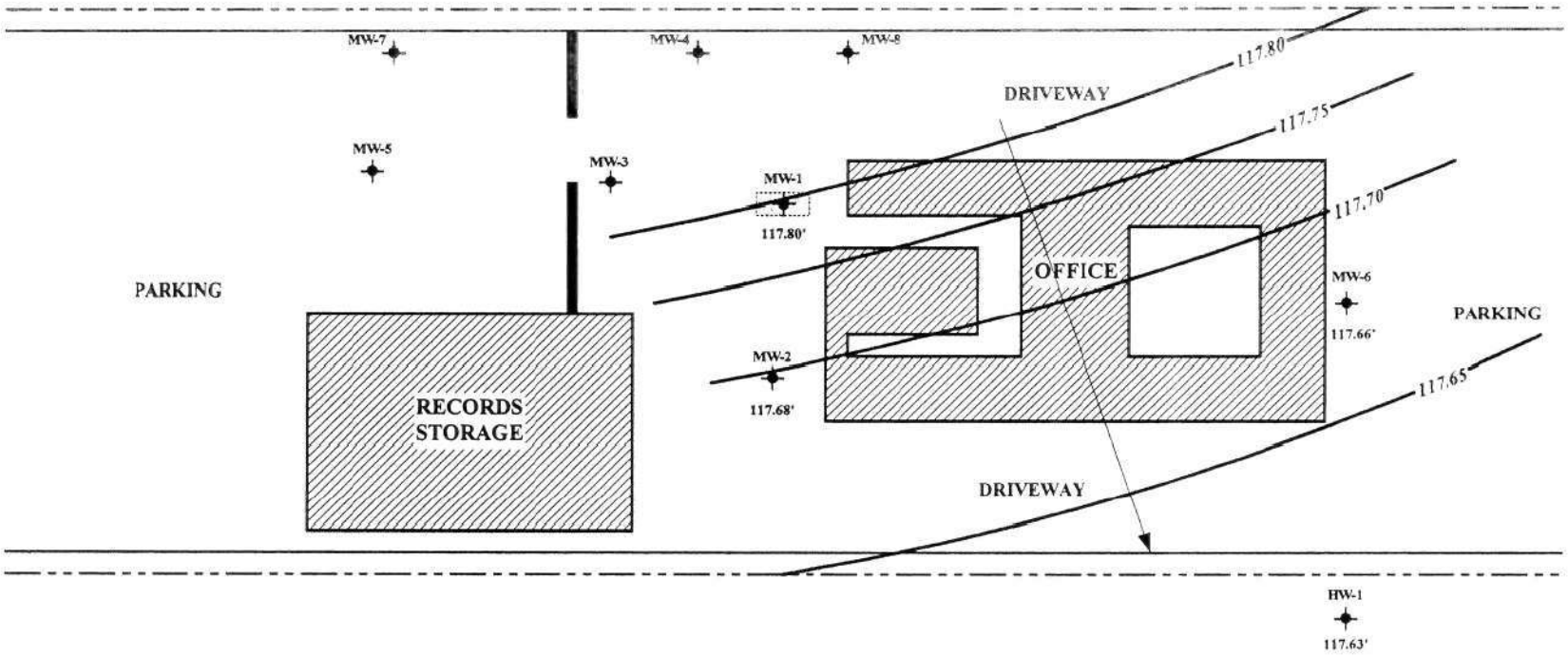
KEY

- Former UST Location
- Monitoring Well Location
- Building

SITE PLAN
UNOCAL CORPORATION
9645 South Santa Fe Springs Road
Santa Fe Springs, California

Environmental Equalizers, Inc.

FIGURE 2



KEY

- Former UST Location
- Monitoring Well Location
- 117.68' Groundwater Elevation in Feet AMSL
- Building
- —117.70'— Groundwater Elevation Contour
- Groundwater Flow Direction

SCALE: 1"=80'

0 48 80 160 ft.

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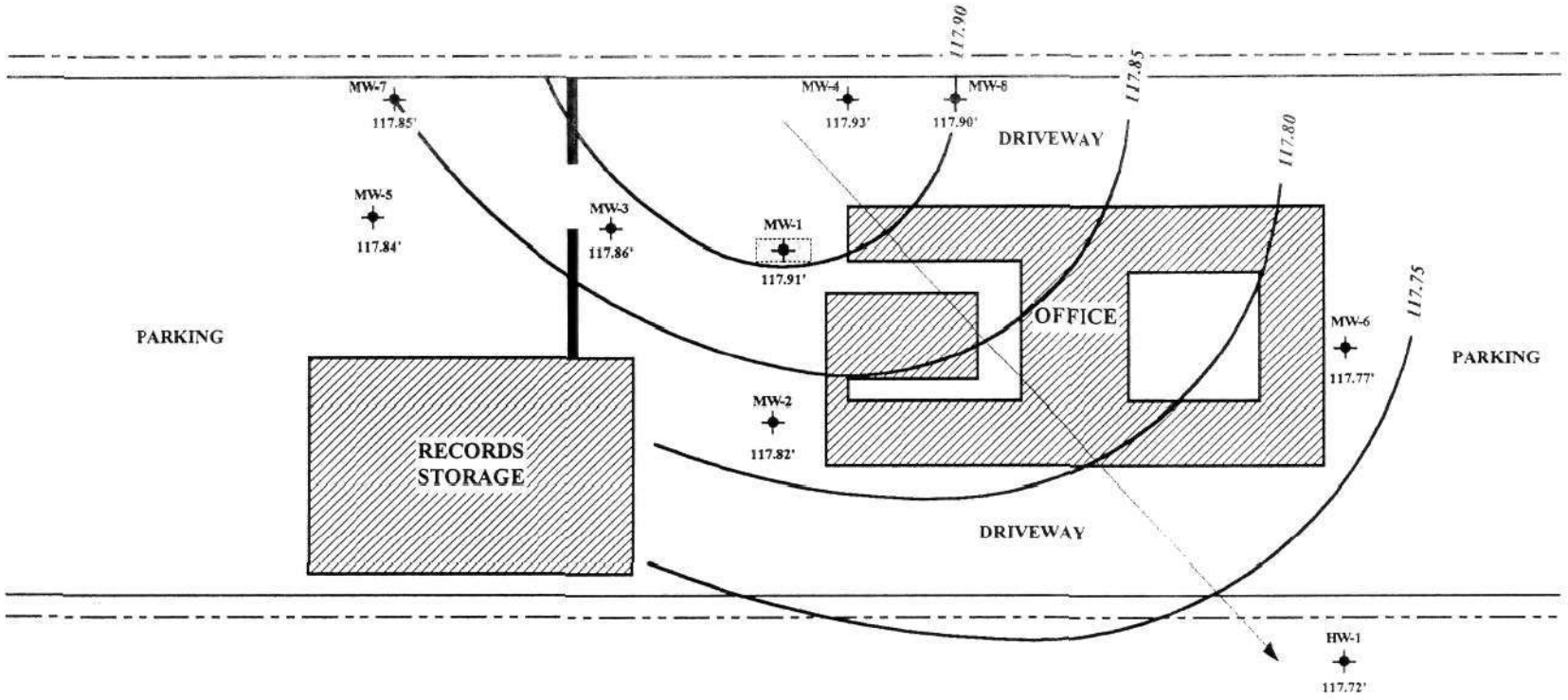
GROUNDWATER GRADIENT - JANUARY 13, 1998

UNOCAL CORPORATION
9645 South Santa Fe Springs Road
Santa Fe Springs, California

Environmental Equalizers, Inc.

FIGURE 3



KEY

- Former UST Location
- Monitoring Well Location
- 117.68' Groundwater Elevation in Feet AMSL
- Building
- —117.70'— Groundwater Elevation Contour
- Groundwater Flow Direction

SCALE: 1"=80'

0 48 80 160 ft.

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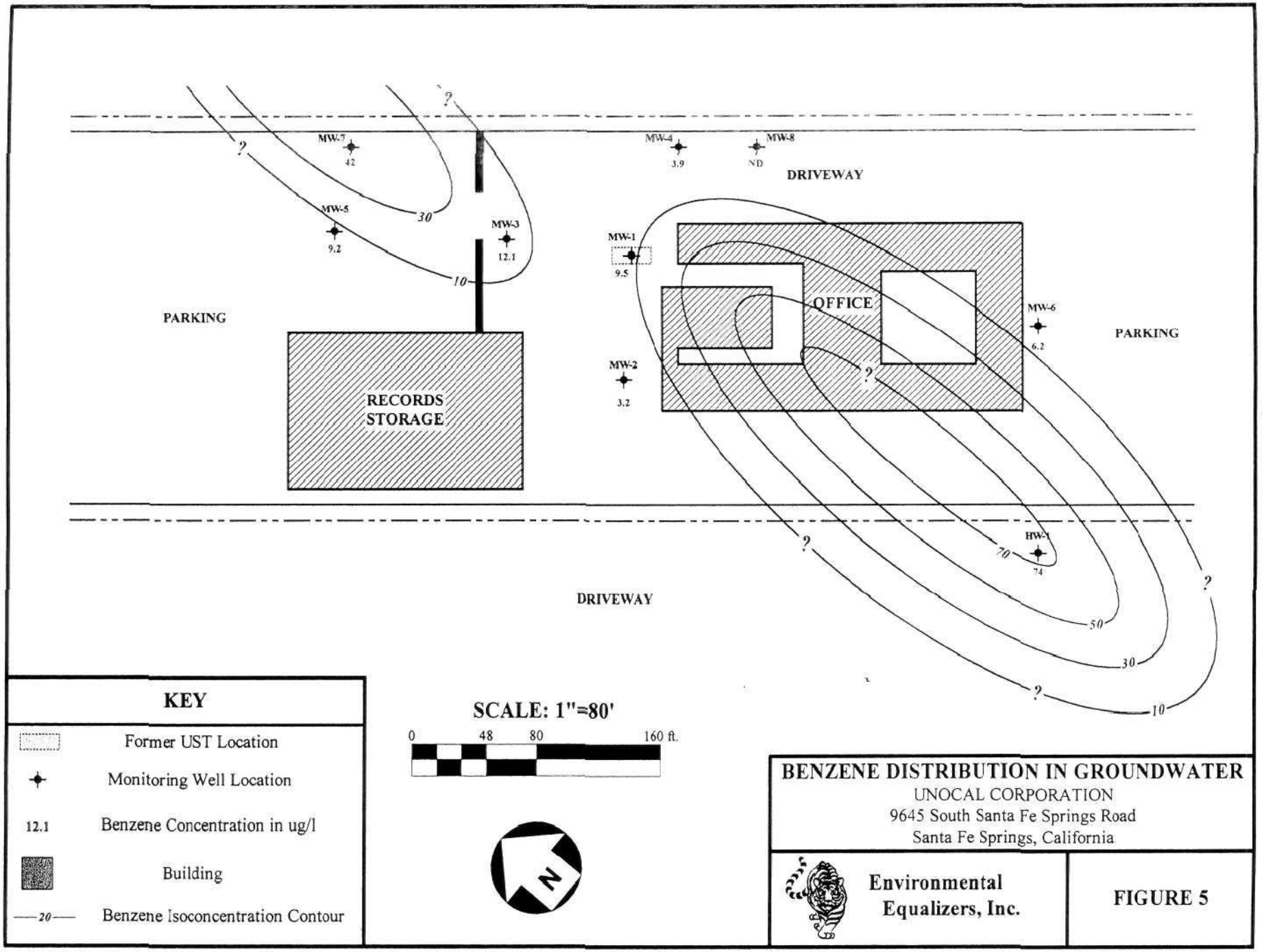
GROUNDWATER GRADIENT - JANUARY 27,1998

UNOCAL CORPORATION
9645 South Santa Fe Springs Road
Santa Fe Springs, California

Environmental Equalizers, Inc.

FIGURE 4


MW-7
42
MW-4
3.9
MW-8
ND
DRIVEWAY
MW-5
9.2
MW-3
12.1
MW-1
9.5
OFFICE
MW-6
6.2
PARKING
PARKING
MW-2
3.2
RECORDS
STORAGE
HW-1
74
DRIVEWAY
?
30
10
70
50
30
10
KEY
Former UST Location
Monitoring Well Location
12.1 Benzene Concentration in ug/l
Building
20 Benzene Isoconcentration Contour
SCALE: 1"=80'
0 48 80 160 ft.
N
BENZENE DISTRIBUTION IN GROUNDWATER
UNOCAL CORPORATION
9645 South Santa Fe Springs Road
Santa Fe Springs, California
Environmental
Equalizers, Inc.
FIGURE 5